Hübner includes three species under this definition. The first, *ain* Hübn., is not congeneric with the others, being referable to *Autographa*. I have therefore regarded the second, *divergens* Fab., = *hochenwarthi* Hoch., as the type. Under this restriction *Caloplusia* Smith is synonymous. The restriction was made by Guenée (Spec. Gen., VI, 355) in 1852, who excluded *ain* from his section *Syngrapha*. Hübner evidently intended to include all the yellow hind-winged Plusias in *Syngrapha*, but this group can not be structurally defined.

CONTRIBUTIONS TO THE KNOWLEDGE OF NORTH AMERICAN ARCTIIDÆ.—III.

(PLATE XI.)

BY OTTO SEIFERT.

Arctia radians *Walker.*

Apantesis radians WALKER, Cat. Lep. Het., pt. III, 1855, p. 632 (female).
Arctia phalerata var. *incompleta* BUTLER, Ann. Mag. Nat. Hist., Vol. VIII, 5th Ser., 1881, p. 311 (male).

Several *Arctia* larvæ were found hidden under boards during the daytime in rich hammock clearings at Island Grove, Florida, in different stages of development from the beginning of March to the middle of May. The larvæ were velvety black with a dorsal chain of milk-white spots and with reddish subventral hairs. They were fed with what appeared to be a variety of *Taraxacum*. First pupa obtained May 8th transformed to imago (♀) May 18th. Exposed at the hammock clearing, the ♀ was found with a ♂ the next morning and deposited eggs at once. These were taken to New York City, May 20th.

Eggs.—"Obtuse cones," light straw color with rather bright, apparently smooth surface, the fine reticulations only visible when magnified. Diameter at base about 0.65 mm. At the time of exposure the temperature at Island Grove was about 37° C. On arrival in New York the weather was continuously rainy and cold, almost without exception, the thermometer vacillating between 13° C. and 18° C. till nearly June. June 1st, early in the morning the young larvæ left their egg-shells of which they ate the larger part and remained idly for hours

near the remnants of the iridescent membranes. The larvæ were reared to maturity on *Taraxacum taraxacum* and *Plantago major*, with occasionally some lettuce leaves. Structurally they do not deviate from the other larvæ of the group, the arrangement and development of warts and bristles being normal. (G. H. French, Papilio, Vol. II, p. 176, 1882; A. Gibson, Can. Ent., Vol. XXXII, p. 369, 1900.)

Stage I.—The newly hatched larvæ are semitransparent, of a sordid yellowish-white with black warts. The head jet black, sparsely hairy; clypeus, epistoma, and mouth parts sordid whitish, the latter tipped with brown. Hairs emitted singly from the warts, rather long but even, except a few long projecting hairs from the anal segment; legs concolorous with body.

The singular variability of the young larvæ during growth in the first stage, which makes them appear all shades from amber color and smoky greenish to sordid white, seems to have its cause in the irregular accumulation of pigment around the bases of the warts.

Stage II.—Right after moulting the larvæ attain an average length of 3.5 mm. when resting, measured from head to anal feet. Width of head 0.6 mm. A white dorsal stripe, narrow on thoracic segments, widening and attenuated in the middle of abdominal somites, and the stellate uneven bristles on the warts are the most important features obtained at this stage. The opaque white dorsal stripe is only partly present on the prothoracic segment; narrow and even on second and third thoracic and anal segments; the abdominal somites, except the last one, have the stripe rather narrowed anteriorly owing to its evading the bases of the minute subdorsal warts (i), but extending posteriorly to the large subdorsal ones (ii) (Dyar, Entom. Amer., Vol. VI, p. 74, 1890) and narrowing again near suture of somite. The bases of warts i and ii are brownish, the brown shades spreading and uniting to form a brownish band or area, less developed on the thoracic segments; below this lateral area the color is uniformly sooty grayish, amber, or dusky green, only the summits of the warts blackish, their bases dusky orange. The hair on anterior warts of first segment is turned over the upper part of head.

Stage III.—After the second moult the larvæ attain an average length of 7.5 mm. when resting; width of head 0.9 mm. No material changes have taken place, but the colors are more intensified. Subdorsal warts bright black from their bases. The whole space below lateral area dusky orange, sutures of suprastigmatal region more or

less shaded with bright reddish-brown. Bristles diverging in stellate groups, of uneven length; those of warts i and ii black; the other warts have the larger bristles black, the smaller ones whitish. Thoracic legs brown, abdominal ones concolorous with body; venter sooty olive.

Stage IV.—Pronounced changes are only in size and the more marked colors. Average length of larvæ 1.25 cm.; width of head 1.5 mm. The white band is inclined to separate into spindle-shaped spots. Lateral area dull brown; below this brown zone dusky amber to obscured orange. Warts black, shiny; bristles on stigmatal tubercles and below grayish with a few black ones.

Stage V.—During this stage the larvæ attain an average length of 2.2 cm. when resting. Width of head 1.8 mm.; width of third and fourth segments 4 mm. Head black, polished; setæ of various length, sparse; epistoma, mouth parts and antennæ sordid whitish, the latter tipped with black. Neck pale reddish-brown. Body subdorsally and laterally more or less dark dull brown, with black tubercles and bristles; space below sooty-amber, variable in shade, warts black.

Bristles of stigmatal warts and downward pale rust-red as is also the hair bent over vertex of head. The dorsal white band is separated into spindle-shaped or rounded spots, which in some individuals become obscured. Stigmata elliptical, deep ochre with black rim. Thoracic legs black, prolegs blackish above; feet ochre.

Stage VI.—Average length of larvæ 3.0 cm.; width of head 2.5 mm. In general the whole area above stigmata is deep velvety black; warts bright with black bristles. A row of prominent, mostly rounded, spindle-shaped or even diamond-shaped white spots, from first to seventh abdominal somites; no spot or trace of one on the prothoracic or anal segments. On second, third and eleventh somites, the white color is reduced to dots or a narrow line. Some of the larvæ have the white spots much obscured and dusky. In a few they are dark slate-colored or scarcely traceable at all. Below the stigmata to the pedal line the color is dull coffee-brown and the bristles as well as those overshading the head are more or less rust-red. Thoracic legs black, joints within greenish-white; prolegs dull pale blackish.

With some of the larvæ the stigmatal and suprastigmatal areas appear almost banded. This has its cause apparently in the insufficiency of dark pigment spreading from the bases of the warts, the dusky amber or orange color of the skin being not entirely overcome.

Stage VII.—Length of larvæ when resting about 3.2 cm.; when in motion 3.5 cm.; width of head 3.0 mm.; width of eighth segment 6.5 mm. Head shiny black, setæ of uneven length, sparse. Epistoma and bases of antennæ sordid greenish-white, tips black. Neck reddish-brown. Dorsal, subdorsal and lateral regions of body velvety black with bright warts. With about 65 per cent. of the larvæ a dorsal row of more or less rounded milk-white spots is present, most pronounced from the fourth to tenth segments, usually narrowed to a fine line on second, third and eleventh segments, always absent on first and twelfth. Below the lateral area the color is a dull, smoky coffee-brown, almost greasy looking; the rows of tubercles and their bases dull black. Stigmata elliptic, narrow, deep ochre with black rim. Venter dull dark brown. Thoracic legs black, bright; within the joints greenish-white, prolegs dull blackish. Bristles of uneven length rather short and stiff, black above the spiracles, reddish from the stigmatal warts downwards, also those anteriorly on first segment covering upper part of head.

About 35 per cent. of the larvæ have the white dorsal spots more or less obscured, some (about 10 per cent. of the brood) have the spots entirely obliterated.

The larvæ before pupating exude moisture and if well fed and kept in roomy cages they form a voluminous, moist but loose cocoon, mostly between leaves and soon transform to pupæ. These quickly turn from pale yellow to orange, reddish-brown and maroon, often covered with a light bluish bloom. Many of the pupæ remain this way, but many deviate remarkably in color. Pupæ formed at the same time vary from uniform reddish-brown shades to reddish-brown with dark brown wing cases; often they are evenly dark brown or with lighter segmental joints; stigmata of the lighter-colored pupæ dark brown. Thoracic segments and sheaths of limbs rather rugose; immovable segments wrinkled and densely punctured, movable ones finely punctured anteriorly, bright and smooth posteriorly. On the vertex just above the eyes are two patches of short, even, knobbed bristles, similar to those forming a brush-like bunch at cremaster. Above spiracles to dorsum the pupa is partly covered with patches of very short even hair, like all the species of this group.

The ♀ ♀ imagines appear first, early in the morning; the ♂ ♂ following soon; the latter when disturbed emit (like all the *Euprepia*) a clear, greenish liquid near the patagia which has a decided "citronella"-like smell.

Eggs deposited in Florida May 20th, hatched June 1st, first pupæ July 1st, imagines July 12th.

Eggs of two broods obtained in New York from the moths bred from the Florida brood on July 15th hatched July 21; pupated August 22d; first imagines September 5th. Stragglers not taken into consideration, the time from depositing of eggs to imago state during the warm months was 50 days. The variability in size of the pupæ finds its cause in the sexes; three pupæ measured: Length 1.65, 1.8, 1.9 cm.; width of fourth to sixth segment 5.0, 5.5, 6.5 mm.

The imagines were at first considered to be a variety of *Arctia vittata*. Twenty-five freshly emerged ♀ ♀ were successively exposed at Rutherford, New Jersey, at such places where *A. naïs*, *phalerata* and *vittata* are found; females were also exposed on Staten Island during the season, but none of these found mates. Twelve ♀ ♀ more were sacrificed in this experiment on wooded lawns and meadows in Bronx and at West Farms, where *A. vittata* is positively to be found, and six on Long Island—but always without favorable result; they did not attract their own kind near New York.

About 500 perfect specimens of the three broods were examined. It led to the conclusion that they are neither *naïs*, *phalerata* nor true *vittata*. The very constant ♀ ♀ approach *vittata* closely, but the black color on the abdomen is never so prevailing as with *vittata* and the secondaries are always red. The very variable ♂ ♂ are nearest to *naïs* (♂), were it not for the unchangeable pale costa and the usually unbroken marginal band on secondaries. Out of the entire number of specimens obtained only one, a ♀, has the costal margin nearly edged by a fine black line, but the black color does not reach the root of the wing. All the rest have the yellowish costal stripe extended to the edge.

The comparison of 212 ♂ ♂ and 212 ♀ ♀ obtained from the three broods of the Florida form shows the following results, relative to the other forms of the group:

Males.

≥ mark complete	none.
≥ mark indicated or partly present	16.
Without trace of ≥ mark	196.
Black marginal band on secondaries disconnected or broken into spots	85.
Marginal band on secondaries entire	127.
Hind wings red with black maculation	none.
Hind wings ochre, profusely suffused with red, sometimes red prevailing	212.
Hind wings plain yellow or ochre	none.

The more obsolete the maculation on secondaries, the more is the tendency to form a ≷ mark on primaries and to widen the longitudinal bands. The discal spot is usually obliterated where the black band is broken into spots.

Females.

≷ mark or traces of if present .....none.
Marginal bands on secondaries broken.....none.
Secondaries yellow, ochre or suffused with red.....none.
Secondaries red with broad black marginal band.....212.

Male.—Head, collar and thorax dull yellowish, collar with two black stripes or spots, often immaculate; thorax with three black stripes; abdomen above rather deep ochre, dorsally banded with black, the band most extended centrally, narrowed on last segment; the width of this band very variable. Head, thorax and abdomen below, also legs and antennæ black, only a few yellowish hairs near chest.

Primaries black with rather prominent yellowish-white fringes. Stripes pale ochre; costal stripe reaching transverse posterior band; the ochre color covering the edge of costa often to its whole length. The central longitudinal stripe unites with transverse posterior band and both terminate; the former sending off a more or less extended submedian dart or streak, often forked at the end, towards inner angle. Interior margin bordered with an ochre stripe.

Secondaries ochre, rarely very pale, the ochre mostly suffused with deep salmon or reddish, the latter often prevailing, always most intense near inner margin. Costal region blackish, the black deepening and extending at apex, forming a broad marginal band indented below apex and never reaching anal angle. Fringes as on fore wings. The black marginal band is subject to reduction into spots; rarely reduced to an apical spot and costal margin only. This reduction is generally accompanied by an extension of the submedian stripe on primaries to the inner angle and an attempt to produce a ≷ mark.

Female.—Head, collar and thorax as with ♂; abdomen black below, above varying from red to ochre, interspersed with reddish hairs; dorsally banded with black to tip of abdomen. This band is sometimes of uniform width, but usually attenuated in the middle, very rarely filling dorsal and lateral space so as to leave only a narrow reddish stripe above the confluent, tooth-like black bands below. Fringes of wings less prominent than with ♂.

Primaries black, only costal and central longitudinal stripes present, the transverse posterior band fused with the longitudinal bands. The

ochre-colored costal stripe beyond transverse posterior band is limited to the extreme edge of costa only, never reaching apex. Often the transverse posterior band is only rudimentary or is lacking altogether. The central longitudinal stripe, never extending beyond the costal stripe, inclines to send off a short submedian streak, thus getting forked at the end. Interior margin bordered by a dull ochre stripe.

Secondaries rather bright red. Costal region blackish, expanding at apex to a broad black band reaching to inner angle. The band is variable in its width and sometimes the black extends beyond the rather prominent discal spot, leaving only a limited red space near root of wing.

The more produced the stripes on primaries, the more reduced is the marginal band on secondaries, and with those individuals where the bands on primaries are only represented by short streaks, the black on hind wings extends from the costal margin and encloses the discal spot, leaving less than a third of the wing red.

The size of the more typical individuals is in both sexes rather constant, varying from 3.7 to 3.5 cm. The aberrative forms (♂) are in general behind this size, never expanding more than 3.5 cm.; dwarfed specimens of both sexes 2.7 (♂ ♂) and 3.0 (♀ ♀) cm. respectively.

This moth has been by no means unknown. Several specimens were collected by Mrs. Slosson in Florida. Perhaps all the ♀ ♀ obtained from the South have been referred to *A. vittata* Fabr., while the males, according to their appearance, were considered as varieties of *naïs*, *phalerata* or *vittata*.*

Walker's description of *Apantesis radians* ♀ agrees with figures 20 and 21, and Butler's description of *Arctia phalerata* var. *incompleta* ♂, agrees with figures 13, 14 and 15.

Several of the first imagines obtained with some of the larvæ were

*Besides the seven specimens which Mr. Seifert kindly gave me, the U. S. National Museum has eight specimens of a brood from Archer, Florida, bred by A. Koebele (Dept. Agr., 2587), one female bred by Riley in Missouri (No. 126 L), and two females captured in Washington, D. C., also a female with thinly scaled hind wings, from Miami, Florida. This form is by far nearest to *A. phalerata* Harr., and differs therefrom only in the greater extension of the black markings. It may not be possible to determine whether it was *radians* or *decorata* that served Fabrician as the basis of his diagnosis of *vittata*, but it seems nearly certain that it is Walker's *radians* in the British Museum.—HARRISON G. DYAR.

sent to Dr. H. G. Dyar as possibly *A. vittata*, but his opinion was that they were neither "true *vittata*" nor "true *phalerata*."

From *naïs* this form is separated easily, notwithstanding the extraordinary resemblance of some of the aberrative forms of both sexes, by the costal black line of the former.

The great majority of *A. phalerata* have a broad and well-developed ≷ mark reaching from costal edge to inner margin and the normal longitudinal stripes are not subject to notable change. In three broods of this southern form there were not a dozen with a ≷ mark and then it was of slender design, never reaching the costa, but the upper arm forming a hook.

Arctia vittata Fabr., is a more robust moth. The abdomen of the female is nearly black, the hind wings red or yellow with a broad marginal band. The males of "*vittata*" have an incomplete ≷ mark, rarely reaching the costa, the marginal band on secondaries is mostly broken up into spots. A singular (perhaps atavistic) aberrative form of *vittata* occurred throughout a whole brood (Long Island); all the males having a complete, diaphanous, marginal band on secondaries, destitute of scales, only edged above with dull blackish.

EXPLANATION OF PLATE XI.

Arctia radians WALKER.

Numbers 1 to 16 include all the varieties of the males.

1, 2, 3 are individuals of the typical form. 4 to 11 show the gradual breaking up of the marginal band and development of longitudinal stripes.

12 to 16 are the rare forms with most complete ≷ mark.

16, with almost immaculate hind wings showing the incapacity to complete the ≷ mark; rather tending to widen the longitudinal bands.

17, is the normal female form. (The specimen from which this figure has been taken does not have a black costa.) 18, 19, 20 and 21 are examples deviating from the normal forms.

NOTES ON NORTH AMERICAN TINEINA.

(PLATE XII.)

BY AUGUST BUSCK,

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Helice *Chambers.*

Chambers characterized this genus (Can. Ent., V, 188) with *pallidochrella* Chambers, as type, thus: